

## CLAIMS

1. Use of pre-sorted, cleaned plastic material wastes, substantially comprising polyethylene and/or polypropylene, for the production of a granular material which is used as a filter for the purification of sewage.

2. Use as set forth in claim 1 characterised in that the granular material is of a grain size which is in the range of between 0.5 and 5 mm.

3. Use as set forth in claim 2 characterised in that the grain size is between about 3 and 4 mm.

4. Use as set forth in one of the preceding claims characterised in that the granular material is of a substantially cylindrical shape, with a cylinder diameter of between about 1 and 5 mm and a cylinder length of between about 1 and 5 mm.

5. Use as set forth in one of the preceding claims characterised in that the granular material has a structured surface.

6. Use as set forth in one of the preceding claims characterised in that the granular material is in the form of a sleeve.

7. Use as set forth in one of the preceding claims characterised in that the granular material is of a very high specific surface area which is in the region of more than 1 cm<sup>2</sup>, preferably more than 2 cm<sup>2</sup> per granular material particle.

8. Use as set forth in one of the preceding claims characterised in that the pre-sorted plastic material wastes are substantially produced from old plastic material bottles consisting to a very great extent of polyethylene and polypropylene.

9. Use as set forth in one of the preceding claims characterised in that the plastic material wastes represent a mixture of at least two polymer materials forming a homogeneous mixture.

10. Use as set forth in one of the preceding claims characterised in that the granular material particles are of a density of between about 0.700 and 0.980 g/cm<sup>3</sup>, preferably between 0.890 and 0.940 g/cm<sup>3</sup>.

11. Use as set forth in one of the preceding claims characterised in that the tensile strength of the granular material particles is approximately in the range of between 15 and 70 MPa and the granular material particles expand under a tensile loading by between about 5 and 20% of their initial size.

12. Use as set forth in one of the preceding claims characterised in that the granular material has a modulus of elasticity of between about 650 and 1500 MPa, preferably between about 900 and 980 MPa.

13. Use as set forth in one of the preceding claims characterised in that the granular materials have a lens-shaped particle form.

14. Use as set forth in one of the preceding claims characterised in that the granular material has cavities whose total volume is less than 10% of the total volume of the granular material particles.

15. Use as set forth in one of the preceding claims characterised in that the polypropylene proportion in the granular material is at least 5% and preferably between about 10 and 20%.

16. Use as set forth in one of the preceding claims characterised in that an addition of between about 0.01 and 5% by weight of a peroxide, with respect to the total weight of the plastic material, is added to the pre-sorted plastic material wastes.

17. Use as set forth in claim 16 characterised by an addition of between about 0.1 and 0.5% by weight of a peroxide, with respect to the total weight of the plastic material.

18. Use as set forth in one of the preceding claims characterised in that the plastic material wastes from which the granular material is produced are cleaned.

19. Use as set forth in one of the preceding claims characterised in that the added peroxide is added in ground form.

20. Use as set forth in one of the preceding claims characterised in that the plastic material wastes from which the granular material is produced contain a plurality of mixed plastic materials.

21. A process for producing a granular material which is suitable as a filter for the purification of sewage, comprising the following steps:

- a) procuring and preparing pre-sorted plastic material wastes, in particular those from the Duales System Deutschland DER GRÜNE PUNKT,
- b) cleaning, chopping and drying said plastic material waste,
- c) heating same to the molten state,
- d) extruding same through a screw or cascade extruder, and
- e) cooling the molten material and cutting the granular material at the desired length.

22. A process as set forth in claim 21 characterised in that prior to step e) there is an addition of between 0.1 and 0.5% by weight of peroxide or peroxide-bearing wastes at the extruder head.

23. A process as set forth in claim 22 characterised in that only between 10 and 20% by weight of the plastic material waste is mixed with between 1 and 3% by weight of peroxide and then homogenised with

between 80 and 90% by weight of the initial material of plastic material waste.

24. A process as set forth in claim 23 characterised in that 15% by weight of the plastic waste material is mixed with between 1 and 3% by weight of peroxide and 85% by weight of the starting material of plastic waste material is mixed and homogenised.

25. A process as set forth in claim 22 or claim 23 characterised in that the temperature in the extruder is degressively adjusted, more specifically at the inlet in the range of between 250 and 300°C and at the extruder head between 180 and 200°C.

26. A process as set forth in claim 21 characterised in that a cascade extruder with a 400 mm sieve and a 2.5 mm apertured plate is used.

27. Granular material which is used as a filter for the purification of sewage, produced from pre-sorted plastic material wastes which contain a plurality of mixed plastic materials, wherein the density of the granular material is approximately in the range of between 0.70 and 0.980 g/cm<sup>3</sup>, preferably in the range of between 0.890 and 0.940 g/cm<sup>3</sup>.

28. Granular material as set forth in one of the preceding claims.